

DEFINED BENEFIT PLANS\*

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Other participants in this educational forum are addressing the setting of retirement income objectives and the sources of income that may be available to meet those objectives. It is generally agreed that retirement income objectives for any group of employees should be set at a level sufficient to permit a retired person and spouse to enjoy a standard of living throughout retirement roughly equivalent to that which they enjoyed during the years immediately prior to retirement. Generally speaking, retirement income from all sources in the range of 50 to 75 percent of gross compensation at time of retirement, dependent upon the level of earnings, will enable a retired individual to enjoy a post-retirement standard of living reasonably comparable to his or her preretirement standard of living. The percentage of preretirement income needed declines as gross earnings increase, primarily because of tax effects.

It would appear that throughout the foreseeable future, the primary sources of retirement income for the bulk of the populace will be Social Security and employer-sponsored pension plans. In undertaking to meet some of its employees' old-age financial security needs, an employer has the broad choice of

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- 2 -

promising a set of retirement benefits, subject to specified conditions, or promising to set aside funds for the employees on a stipulated basis, with the intent that the balance in an employee's account at time of retirement be sufficient to provide the targeted level of income. The latter approach is described as a defined contribution plan and the former as a defined benefit plan. Defined contribution plans predominate in number but defined benefit plans account for the bulk of coverage and pension assets.

The remainder of this paper is concerned with the benefit design and funding of defined benefit plans.

#### A. Benefit Design

The core of a defined benefit plan is a benefit formula that over time and under a given set of circumstances determines the amount of benefits that a plan participant will receive at retirement. Broadly conceived, a benefit formula is composed of three elements: (1) a description of the basis for determining annual benefit accruals, (2) a statement of the conditions under which the benefits will be payable, and (3) a stipulation of the form in which the benefits will be payable. Stated differently, the benefit accrual for a given year of credited service must be defined in terms of the dollar amount of the annual benefit accrual, the age of the participant at which the aggregated benefits will become payable in full, and the annuity form in which the benefits will be paid unless an alternate form of payment is elected by the participant.

- 3 -

Amount of Benefits

All defined benefit plans explicitly or implicitly assign a unit of benefit to each year of recognized service with the employer. The unit of benefit may be expressed as a percentage of compensation, as defined -- the usual procedure under a plan for salaried employees -- or as a specific dollar amount, a type of formula associated with a collectively bargained plan for hourly employees.

Under an earnings-related formula, the unit of benefit credited for any particular year of employment may be based upon the participant's compensation for that year or upon the participant's average compensation during a specified period, such as three, five, or ten years prior to retirement. The first type of formula is called a career average formula, while the second is referred to as a final average formula. A common modification of the final average approach is to base the benefit on a specified period of consecutive years of highest average compensation, whether or not the period fell immediately before retirement.

The principal appeal of the final average formula is that it automatically provides benefits appropriately related to the participant's compensation during the years close to retirement. In other words, it protects the accruing benefits against loss of purchasing power because of inflation. This is a result normally desired by both the plan sponsor and the plan participant, but it creates uncertainty for the sponsor as to the

- 4 -

financial magnitude of its undertaking. The cost is reasonably predictable as a percentage of covered payroll, a more logical measure of cost than dollar outlay.

The dollar value of a career average benefit accrual is known at all times but its future purchasing power is not known nor predictable with any precision. In a period of steady and substantial inflation, the purchasing power of career average benefits can be seriously eroded. For example, if there was a constant 6 percent inflation rate during the entire period of service of a participant who entered the plan at age 25, the benefit produced at age 65 by a career average formula would have only 29 percent of the purchasing power of the benefit produced by a 5-year final average formula. For a 30-year participant, the career average benefit would still be only 43 percent of the final five benefit, assuming salaries reflect inflation in full. To counteract this erosion, the sponsor of a career average plan may amend the plan from time to time to restate the accrued benefits in terms of current compensation. If done frequently enough, this practice will protect accrued benefits reasonably well -- without an advance commitment from the sponsor -- but it can generate substantial unfunded liabilities.

As noted above, many collectively bargained plans express the benefit accrual as X dollars of monthly income per year of credited service. This is an acceptable approach in industries where the range of hourly wage rates is relatively narrow. The current monthly benefit in many industries is \$15 or more for each

- 5 -

year of credited service. The benefit is generally renegotiated every three years and made retroactive to all prior years of credited service to preserve the purchasing power of the accrued benefits.

Most defined benefit plans grant benefit credit for some or all years of service prior to establishment of the plan. This is necessary in order to provide an adequate retirement benefit to those with many years of service and possibly even approaching retirement. Indeed, this is the genius of the defined benefit plan. It is a way to provide adequate pensions to all employees irrespective of their ages or years of service at inception of the plan. It results in an effective allocation of employer pension contributions that favors older and longer service employees. In the process, substantial supplemental liabilities are created, the amortization of which may extend over 30 years. This resource allocation capability of a defined benefit is not needed, it may be observed, for a group of newly hired employees.

In determining the benefit structure of a defined benefit plan, the plan sponsor (and collective bargaining representatives, if any) will usually take cognizance of the benefits available under Social Security. This recognition is described as integration of the plan with Social Security. If provision is made in the plan for a modification of the plan benefits to recognize Social Security benefits, the plan is said to be explicitly integrated. If the plan benefits are initially set at a lower level than they would be in the absence of Social Security, the

- 6 -

plan is said to be implicitly integrated. Implicit integration is feasible only for plans covering groups with relatively flat wage rates. Integration is carried out in recognition of the fact that Social Security benefits favor lower income workers and operate to reduce the need for plan benefits, as a percentage of compensation. Full integration is a significant source of cost-saving for the plan sponsor.

#### Retirement Age

The age at which a participant is permitted to retire with full, unreduced benefits is an essential component of the benefit formulation and is a prime determinant of the cost of the plan. This is identified as the normal retirement age. Most plans permit participants to retire over a range of ages, such as from age 55 to 70, usually with some adjustments to the normal retirement benefit. Thus, there may be early, normal, and deferred retirement.

Normal Retirement Age. At one time a simple notion, normal retirement age has become an elusive concept in many pension plans. In its most elemental form, the normal retirement age is the earliest age at which eligible participants are permitted to retire with full benefits. A more precise definition is provided in Section 2.08 of Revenue Ruling 71-446: "Normal retirement age is the lowest age specified in a plan at which the employee has the right to retire without the consent of the employer and receive retirement benefits based on service to date of retirement at the full rate for such service set forth

- 7 -

in the plan" (i.e., without actuarial or similar reduction because of retirement before some later specified date).

In the private sector, the most common single age specified as the normal retirement age is 65. Under ERISA, the normal retirement age cannot be higher than 65 or, if later, the age at which the employee completes ten years of service. It is customary to require a minimum of five or ten years of credited service for entitlement to benefits at normal retirement age. Because of a general desire on the part of employees to enter on their pensions at ever younger ages, pressure from younger employees to remove older workers from the labor force, and the desire of management to ease employees who have lost their effectiveness from the payroll, the simple concept of a single, designated normal retirement age has been supplanted in many plans and many sectors of the economy by provisions that permit employees under defined circumstances to qualify for full accrued benefits at ages lower than that specified as the normal retirement age. For example, full unreduced benefits for service accrued to date may be made available at age 60 with 20 years of service or at age 55 with 30 years of service. Under these arrangements, it would have to be concluded that there are multiple normal retirement ages, depending upon the related service required and the employee's age of entry into the plan.

In practice the choice of the normal retirement age must be made in the light of cost, personnel policy, and public welfare considerations. In terms of pension costs the normal retirement age is one of the most critical features of plan design.

- 8 -

As the plan's normal retirement age is decreased, there is an associated increase not only in the proportion of employees who will survive in active service to reach retirement but also in the average number of years over which each pensioner will receive benefits. The effect of these changes on plan costs is indicated in Table 1. The table shows the multiple of the level annual percentage of salary needed to fund members' retirement at age 65 that would be required to fund retirement at various other ages. For a member entering the plan at age 35, the annual percentage of the employee's salary required to fund retirement age 55 is more than twice that required to fund retirement at age 65. This is true even though the member will have accumulated fewer benefit accruals at the earlier age. Table 1 also shows that the relative cost of retiring employees at different ages is not overly sensitive to the entry ages of the employees.

**Table 1**  
**Sensitivity of the Cost of Retirement Benefits to the**  
**Normal Retirement Age**

Normal Retirement Age	Level annual percentage of salary required to fund retirement benefits commencing at various ages, as a multiple of the age 65 value.*		
	25	35	45
50	2.8	2.6	2.5
55	2.2	2.1	2.0
60	1.6	1.5	1.5
62	1.3	1.3	1.3
65	1.0	1.0	1.0
70	0.5	0.5	0.6

\* Values based on the implicitly integrated prototype plan.



- 9 -

Another way to view the cost impact of the normal retirement age is to compute benefit accrual equivalencies among various retirement ages. This has been done in Table 2. For the purpose of constructing the second column of the table, it is assumed that a plan initially provides for an annual benefit accrual of 1.5 percent of final three-year average salary payable at age 65 in the form of a single life annuity. The column shows the benefit accruals that would generate an equal cost to the employer if the benefit were to commence at any age from 64 down to 50. The third column shows the benefit accrual for normal retirement age age 65 which would cost the employer the same amount as an accrual rate of 1.5 percent of final three-year average salary if the benefit were to commence at the earlier ages shown.

**Table 2**  
**Comparative Benefit Accrual Rates for Various Male Normal Retirement Ages\***

Normal Retirement Age	Accrual rates up to various normal retirement ages that generate the same costs as an accrual rate of 1.5 percent up to age 65	Accrual rates up to age 65 that generate the same costs as an accrual rate of 1.5 percent up to various other normal retirement ages
65 . . . . .	1.50%	1.50%
64 . . . . .	1.46	1.54
63 . . . . .	1.42	1.58
62 . . . . .	1.39	1.62
61 . . . . .	1.36	1.66
60 . . . . .	1.32	1.70
59 . . . . .	1.30	1.74
58 . . . . .	1.27	1.77
57 . . . . .	1.25	1.81
56 . . . . .	1.22	1.84
55 . . . . .	1.20	1.87
54 . . . . .	1.18	1.90
53 . . . . .	1.16	1.93
52 . . . . .	1.15	1.96
51 . . . . .	1.13	1.99
50 . . . . .	1.12	2.02

\* Values based on 1971 Group Annuity Table with 7 percent interest.

- 10 -

The table indicates that a benefit of 1.5 percent per year of service payable from age 65 costs the same amount as an accrual of 1.32 percent payable at age 60 and 1.20 percent payable at 55. Conversely, a benefit of 1.5 percent per year of service payable from age 55 costs as much as an accrual of 1.87 percent payable from age 65. A benefit of 1.5 percent payable at age 60 would be equivalent to an accrual of 1.70 percent payable from 65. Thus, it may be observed that benefit accrual rates that seem perfectly defensible when payable at a particular retirement age are seen to be excessive from a cost standpoint when viewed in the context of a normal retirement age that has tended to become the norm for plans in the private sector -- and may have to become the norm for public plans.

With respect to the pension plan's function as an instrument of personnel policy, the normal retirement age is a statement of the employer's desires concerning the timing of employee retirement. If the employer wants employees to retire at relatively young ages, then this should be encouraged by incorporating a low normal retirement age in the pension plan or by providing very generous retirement privileges prior to normal retirement. If the employer wants the employees to remain on the job as long as they are effective, then the normal retirement age should be pushed back and attractive deferred retirement provisions should be provided. The normal retirement age need not be viewed as the mandatory retirement age.

The normal retirement age should not be set in the absence

- 11 -

of economic and societal considerations. From a purely economic standpoint employees in both the public and private sectors should continue in active employment as long as their mental and physical powers permit. Society as a whole would benefit from the increased flow of economic goods and services from prolonged employment, and the physical and psychological well-being of many individuals would be enhanced by a continuation of meaningful economic activity. Of course, if the economy is not expected to generate enough jobs to provide employment for all present and future members of the labor force, a lower retirement age might be needed to remove the older workers from the labor force and permit their places to be taken by persons just entering the labor market. It could also be argued that society might prefer more leisure time to pursue recreational, cultural, and other noneconomic interests, even if it means a lowering of their financial standard of living. In other words, society might logically sanction an institutional arrangement under which members of the labor force would be afforded the opportunity to spend many years in full-time noneconomic pursuits at the end of a moderately long service career. Such a societal judgment would obviously involve a balancing of economic and noneconomic considerations.

Unfortunately, there is no body of economic, political, or social theory that points unequivocally to the optimum normal retirement age from a societal standpoint. Most business firms chose age 65 because of the precedent set by the Social Security

- 12 -

Act in 1935. Today, life expectancy is much longer, general health is improved through medical advances, and technology has reduced the physical demands of most jobs. These factors alone argue for a higher retirement age than that which has been institutionalized in this country.

An even stronger argument for a later retirement age is found in the changing demography of this country. The drastic decline in fertility rates that has occurred over the last decade and seems likely to be sustained throughout the immediate future will ultimately produce a situation in which a shrinking labor force must support an expanding retired population. It has been predicted that if the fertility rates remain at their present level until the year 2010, when the individuals born in the "baby boom" of the late 1940s begin to reach retirement, there will be one Social Security beneficiary (including children and other secondary benefit recipients as well as retired persons) for every two persons in the active labor force. This would put a tremendous strain on the available goods and services unless an unprecedented increase in productivity were to occur in the meantime. While these economic and demographic forces do not argue for an immediate raising of the normal retirement age in all existing pension plans, they do argue for a halt to the trend toward ever lower retirement ages and a move towards higher retirement ages.

- 13 -

Early Retirement. In order to further utilize the pension plan as an instrument of personnel policy, an employer may choose to permit employees to retire with reduced benefits at ages prior to the normal retirement age. A plan permitting normal retirement at age 60, for example, might provide for retirement with reduced benefits at age 55 if the employee has accumulated ten years of creditable service.

The early retirement benefit is generally calculated as a percentage of the accrued portion of the benefit that would have been paid at the normal retirement date. Some plans provide for a stipulated percentage discount for each month by which actual retirement precedes the normal retirement date. Typical discounts are one half of one percent per month (6 percent per year) or  $1/180$  per month ( $6\frac{2}{3}$  percent per year). On the other hand the discount factors may depend on the interest and mortality assumptions that the actuary uses to value the plan costs and liabilities, in which case the reduction is said to be actuarial.

An arbitrary scale of reduction factors, particularly the one half of one percent reduction per month, is easier to explain to participants than the full actuarial reduction. It is frequently designed to encourage early retirement, being coordinated with the overall personnel policy of the employer. The general practice of using early retirement factors more favorable to the employee than the full actuarial reduction is referred to as subsidized early retirement.

- 14 -

The cost to the employer of an early retirement program is not easily ascertainable since it depends on several factors which have offsetting characteristics. Moreover, some of these factors are dependent on the age and sex mix of the plan and the other provisions of the plan. In the first place there is the age at which benefits commence. The cost of a specified monthly income beginning at age 65 is significantly less than the cost of the same benefit payable from age 60. On the other hand an employee who retires early gives up future creditable service as well as future salary increases; therefore, the employee's full benefit (i.e., before reduction on account of early retirement) will be appreciably less than if taken at the normal retirement date. Then there is the consideration of the precise reduction factors that are applied to the accrued benefits and the amount of retirement income subsidy which the employer is willing to support. Also there is the question of possible benefit increases based on cost-of-living indices that may enhance the value of the earlier income stream. There is one final factor, the impact of which cannot be ascertained from the pension plan balance sheet. If employees are encouraged to retire at earlier ages, there is an associated cost of payroll for new entrants to the plan. While it is true that the employer saves the cost of the payroll for the persons who retired, it may be that younger employees must be promoted at a faster rate, thereby minimizing and possibly negating potential payroll savings.

- 15 -

Deferred Retirement. Participants in a pension plan may want to continue in service beyond the normal retirement age in order to earn additional benefit credits, to enlarge the salary base to which the benefit formula will apply, to spread the liquidation of the accumulated assets of a money purchase plan over a shorter period of years (and thus increase the amount of the periodic payments), or to enjoy the continuation of their salary. There may also be nonfinancial reasons for wanting to continue on the job.

Prior to the 1978 Amendments to the Age Discrimination in Employment Act, corporate pension plans generally stipulated that a participant could continue in service beyond normal retirement date only with the consent of the employer and then only to the mandatory retirement age, which might be age 68 or 70. Practice varied as to whether an individual permitted to continue in employment would receive benefit credits for the additional years of service and would have the benefit base adjusted for salary increases. The retirement systems of public bodies tended to permit participants to remain in service beyond the normal retirement age without the employer's consent, up to a specified mandatory retirement age, such as 70. Benefits for the additional years of service accrued in the normal manner, and salary increases were recognized for benefit compensation purposes.

The 1978 Amendments to the Age Discrimination in Employment Act (ADEA) made it unlawful for an employee benefit plan or

- 16 -

seniority system of a private sector employer or a state or local government entity to require or permit the involuntary retirement of an employee prior to age 70. The law does not require the plan sponsor to credit benefits for service beyond normal retirement age, to recognize salary increases for benefit computation purposes, or to make contributions under a defined benefit or defined contribution plan on behalf of employees who continue in service beyond normal retirement age. Nor does the Act require an actuarial adjustment in the employee's benefits to reflect his actual age at retirement.

There is a wide range of opinion as to what benefit an employee who delays retirement beyond normal retirement age should receive upon actual retirement, and practices currently reflect this diversity of opinion. At one extreme is the view that the employee should receive precisely the same dollar benefit that the employee would have been entitled to had he retired on the normal date. The basic argument in favor of this position is that the plan promised a benefit payable from a specified date, which the employee could have received by retiring on that date without the consent of the employer. By continuing to work, the employee enjoyed the economic benefits of a full salary, which would typically be much larger than a pension. Having enjoyed that advantage with the approval of the employer, the employee has no right to claim a higher pension upon eventual retirement. Under this approach, delayed retirement reduces the employer's cost by the benefits that



- 17 -

would have been paid had the participant retired at the normal retirement age, and the employer incurs no cost for pension accruals in respect of the participant after the normal retirement age. This practice is permissible under ERISA and the amended ADEA.

At the other extreme is the view that the employee should upon actual retirement receive benefits that are the actuarial equivalent of those that would have been payable at the normal retirement date, adjusted for any increase in the salary base and augmented by additional benefit credits at the regular rate. This approach offers a strong inducement for employees to continue in service beyond the normal retirement date.

Between these extremes a number of intermediate positions may be found. Table 3 displays the impact of several of these intermediate deferred retirement policies on the amount of monthly benefit receivable at ages after the normal retirement age (i.e., age 65). The first column of the table shows the impact of allowing the deferred benefit to be based on the updated final average salary of the retiring employee. The increase in the retirement benefit is seen to be 5 percent per year, which is the assumed rate of increase in salaries at the older ages. The next column indicates the impact of adjusting the retiring employee's benefits for only the benefit accruals earned subsequent to the normal retirement date. Since it is assumed that the retiring employee entered the plan at age 30, by retiring at age 68, for example, he would have accrued 38

- 18 -

**Table 3**  
**Effect of Deferred Retirement Provisions on Retirement Income**  
**Receivable**

Deferred Retirement Age	Retirement benefit payable as a percentage of benefit payable at age 65*			
	Update Final Average Salary Only	Allow Additional Accrued Benefits Only	Provide Actuarial Equivalence Only	Adjust for Salary, Service, and Equivalence
65	100%	100%	100%	100%
66	105	103	114	123
67	110	106	129	151
68	116	109	148	186
69	122	111	169	229
70	128	114	195	285

\* Table is based on implicitly integrated prototype plan.

Assumptions: Age 30 entrant.

Salaries increase at 5 percent per year plus merit.

Benefit is straight life annuity increasing by 4 percent per annum.

instead of 35 years of service, but this additional accrual would be applied to the final average salary as of the normal retirement date. The third column exhibits the effect of providing the actuarial equivalent of a benefit which could have been received at age 65. Under this policy, the cost to the employer is independent of the retirement age. The benefit amount is increased primarily because of the shortened payout period but is also dependent on the interest and mortality assumptions used by the actuary to value the plan liabilities. Note that the benefit amount is not affected by an increase in the final average salary, nor by additional earned creditable service of the employee. The table shows that this deferred retirement policy provides a strong inducement to the employee to remain in employment after the normal retirement date.

- 19 -

Finally, the last column reveals the impact on retirement benefits of an extreme deferred retirement policy providing credit to the employee for additional service, an increased salary base, and the reduced payout period. The impact is so great that the proportion of preretirement earnings provided in deferred retirement would probably be substantially in excess of any logical targets. In any event the employer's attitude toward the delayed retirement provision may be influenced not only by philosophical and actuarial considerations, but also by personnel policy; that is, whether the employer wants to encourage or discourage the employees to continue in employment beyond the normal retirement date.

Normal Annuity Form. As noted earlier, the benefits under a pension plan are established and their associated costs calculated on the premise that the benefit payments will conform to a particular pattern. This pattern is known as the normal annuity form, even though the plan may be funded through a trust and the benefits paid directly from the trust fund rather than in the form of insurance company annuities. The normal annuity form specified in most noncontributory plans is the straight life annuity, which provides monthly payments to a single, designated individual (the employee in a pension plan), for as long as the employee lives, with no payments to the estate of the deceased or any other person. Contributory plans usually adopt a modified cash refund annuity. This form

- 20 -

promises that should the employee die before receiving retirement benefits equal to the accumulated value at retirement of contributions, the difference between the benefits paid and the accumulated contributions will be refunded in a lump sum to the estate or to a designated beneficiary. Some contributory plans prescribe a life annuity with payments guaranteed for five or ten years, either form of which will generally ensure the return of the employee's accumulated contributions.

Pension plans have traditionally given the participant the option of electing, either before or at retirement and at his own expense, an annuity form different from that prescribed in the plan document. The range of options has differed, some plans offering a wide choice and others being rather restrictive, but it has been customary to offer some form of joint and survivor annuity in order that the participant might assure his spouse of a life income in some amount. One type of joint and survivor annuity provides for an initial benefit amount to be paid while the pensioner and spouse are both living and an ultimate amount (usually less than the initial amount) to be paid after either recipient dies. A second type of annuity provides that the initial amount will be paid as long as the plan member is living and that the ultimate amount will be paid only if the spouse of the member is the only living recipient. This form is called a joint and contingent survivor annuity.

- 21 -

In response to increasing concern over the general failure of plan participants to elect voluntarily a joint and survivor annuity for the protection of their spouses, Congress ordained through ERISA that all qualified pension plans must provide that retirement benefits payable to an employee married to a current spouse for at least one year will be automatically paid in the form of a qualified joint and survivor annuity form unless the participant elects otherwise. A qualified form is a joint and survivor contingent annuity that provides income to the surviving spouse in an amount equal to at least one half of the income payable during the time that the employee and spouse are both alive.

In the absence of a provision to the contrary, the spouse would lose her interest in the joint and survivor annuity if the participant were to die before retirement. This is considered to be a particularly inequitable consequence if the participant dies after becoming eligible for early retirement but before entering on the joint and survivor annuity. ERISA now requires that a participant be permitted to make an election that would have the effect of providing joint and survivor annuity benefits to the spouse if the participant dies after eligibility for early retirement (within ten years of normal retirement) but before actual retirement. Legislation currently before Congress would extend this protection to all vested benefits and provide a surviving spouse with one-half of the participant's vested benefits if he should die before retirement.

- 22 -

The financial significance of providing normal annuity forms other than a straight life annuity can be appreciated by reference to Table 4. For various ages at retirement, the table displays the cost of the alternative forms as a percentage of the cost of the straight life annuity. The least costly alternative annuity form is seen to be the five-year certain annuity which guarantees payment for five years. This is because about 90 percent of the annuitants who retire at age 65 will survive the five-year period, thereby rendering the guarantee of little value. The additional cost of the ten-year certain annuity, on the other hand, is seen to be sensitive to the retirement age. It is not unlikely that the guarantee will serve to extend the payment period for the older retirees. The cost of the modified cash refund annuity is based on the assumption that employee contributions of 5 percent of salary have been paid from age 30 and have been credited with 7 percent interest per annum. Under these assumptions the accumulated contributions are fully paid out after a period of

**Table 4**  
**Cost of Various Annuity Forms as a Percentage of the Cost of a Straight Life Annuity\***

Annuity Form	Retirement Age				
	55	60	62	65	70
Straight Life	100%	100%	100%	100%	100%
Five-Year Certain	101	101	101	102	104
Ten-Year Certain	102	104	106	108	116
Modified Cash Refund	101	102	102	103	108
Joint and One-Half Survivor	112	114	115	117	119
Joint and One-Half Contingent Survivor	116	119	121	123	127
Joint and Full Survivor	133	139	142	146	153

\* Assumptions: Employee contributions made from age 30 at 5 percent of salary, credited with 7 percent interest per annum.  
 Pensioner is male with spouse 3 years younger.  
 Annual payment increases by 4 percent per annum.

- 23 -

between five and ten years, so that the cost of this form lies between the costs of the 5-year and 10-year certain annuities.

The additional costs of three types of joint and survivor annuity forms are displayed in the table. As should be expected, the cost of reducing the benefit to one half the initial amount when either recipient dies (joint and one-half survivor) is less than the cost of reducing the benefit amount only when the spouse of the plan member dies (joint and one-half contingent survivor). The most costly of the annuity forms shown in Table 4 is the joint and full survivor which provides for the initial benefit amount to be continued as long as either spouse is living.

A perennial issue in plan design is whether a participant upon reaching retirement should be permitted to take the actuarial value of retirement benefit in the form of a lump sum rather than in monthly payments spread over remaining lifetime.

Justification for the cash option is generally couched in terms of flexibility of financial planning. It is argued that some employees have a more urgent need for a lump sum rather than for a life income. They may need the money for medical treatment or to buy a retirement home. Some may want to invest in a business of their own. Others may feel that they can invest their share of the plan assets more profitably than the investment manager or in a way that will provide more protection against inflation. In some cases, the pension benefit may be too small to justify installment payments, while in others

- 24 -

it may be so large that the participant should be permitted to draw down some of it in a lump sum. Under some plans, the cash option may have been the only way that an employee in poor health could preserve his pension for the protection of a spouse or other dependents. In the final analysis the employer must decide whether the pension plan is to be regarded as a general savings program with all the flexibility that one would want in such a program or as an instrument of business and social policy designed to ensure a dependable source of income throughout the remaining lifetime of retired workers.

The cash option and all annuity options involve the concept of actuarial equivalence. That is, any optional form of benefit payment must have the same actuarial value as the normal retirement benefit and any other optional benefit. Inasmuch as the concept of actuarial equivalence can be rather imprecise or "flexible" in application, the Internal Revenue Service has decreed that beginning January 1, 1984 all plans must either specify the specific adjustment factors that will be applied in optional benefit settlements or the actuarial assumptions (mainly mortality and interest) that will be used. This is in implementation of the requirement that benefits be "definitely determinable." The ruling was primarily designed to prevent abuses in the use of "market" rates of interest in calculating the cash out or lump sum value of accrued benefits.



- 25 -

The IRS ruling does not bar the use of current interest rates but if they are to be used, they must be determined in accordance with an objective standard articulated in the plan.

#### Cost-of-Living Adjustments

If one subscribes to the notion that at point of retirement an individual should have a flow of income sufficient to sustain his or her preretirement standard of living, it is difficult to argue against the logic of protecting the purchasing power of that income during the individual's retirement years. The erosive impact of inflation on the purchasing power of any flow of income is all too familiar to this generation but Table 5 provides perspective in terms of pension benefits.

**Table 5**  
**Purchasing Power of Benefits under Selected Rates of Inflation and after Selected Time Periods as a Percentage of Purchasing Power in a Noninflationary Environment**

Time Period	Inflation Rate (percent)				
	0	2	4	6	8
5 years	100%	91%	82%	75%	68%
10 years	100	82	68	56	46
15 years	100	74	56	42	32
20 years	100	67	46	31	21
25 years	100	61	38	23	15
30 years	100	55	31	17	10

- 26 -

The table shows, for example, that with a steady 6 percent rate of inflation, a stream of pension income will lose a fourth of its purchasing power within five years and almost half by the end of ten years. Within fifteen years after retirement -- the approximate life expectancy of a male aged sixty-five -- the purchasing power of an individual's pension benefits will be only 42 percent of its initial value. Naturally, the erosion of purchasing power is less with lower levels of inflation.

The same type of erosion occurs with respect to the vested benefits of terminated participants, since typically the deferred benefits of such persons are frozen at their pretermination level. The loss of purchasing power is a function of the elapsed time between termination and retirement and the rate of inflation. This may be seen in Table 6.

**Table 6**  
**Loss of Income Attributable to Nonindexed Vested**  
**Deferred Benefits**

Number of Vested Annual Benefit Accruals Earned		Initial Monthly Income Received as a Percentage of Income Available from Sole Pension Plan*
First Plan	Second Plan	
0	35	100%
5	30	88
10	25	78
15	20	70
20	15	68
25	10	70
30	5	81

\* Employee is assumed to enter second plan immediately upon withdrawal from first plan. Salary is assumed to increase by 5 percent plus merit per year. Both plans are assumed to have identical benefit structures, including full vesting of accruals after five years of creditable service.

- 27 -

This table assumes that a particular individual earns benefit credits in two successive pension plans having identical benefit structures, the benefits in the earlier plan being vested. If an individual accumulated ten years of pension credits in the first plan and twenty-five in the second, the combined benefits of the two plans at retirement will amount to only 78 percent of the benefits payable if all the service had been in the same plan, assuming that salaries increase by 5 percent plus merit each year. If the person had had twenty years of service in the first plan and fifteen in the successor plan, the combined benefit would be only 68 percent of the amount that would have been paid if all service had been in one plan.

Employers are not psychologically attuned to indexing or adjusting the benefits of individuals who have left their employ, presumably in search of greater economic opportunities. Nevertheless, it is interesting to note that on the basis of typical experience and 5 percent sustained inflation, the vested benefits of a plan could be fully indexed at an additional plan cost of 10.8 percent.

It is expensive to index or otherwise adjust the benefits of retired persons to protect their purchasing power. At a 5 percent level of inflation, full indexing of benefits of retired persons would increase the level percentage of payroll cost of a plan by about 54 percent. Annual adjustments of 10 percent would more than double the long-run cost of the plan.

- 28 -

Decisions concerning indexing depend importantly on judgments about the allocation of economic resources between the working and non-working elements of the adult population. This issue has both economic and ethical implications, not to mention the political. If indexing is to be undertaken, a choice must be made as between wage and price indexing, as well as among the various indexes that are available or could be constructed.

#### B. Funding

If a pension plan promises a set of determinable benefits -- as a defined benefit plan does -- the sponsor assumes responsibility for accumulating enough plan assets to pay the promised benefits. The cost of a set of benefits can be determined only in retrospect, so the funding policy of the plan sponsor must be based on the best estimates of future costs that can be provided through actuarial assumptions and techniques.

The plan participants may be asked to bear a portion of the plan costs through mandatory contributions, especially in the public sector, but the sponsor -- i.e., the business enterprise or employing agency -- has the ultimate responsibility of assuring asset adequacy. Consequently, the plan sponsor usually sets the investment policy of the plan and is credited with any investment earnings in excess of those assumed to be earned in the actuarial cost projections. By the same token, the sponsor must make up any deficiency in investment earnings as compared to projections. It is relevant to note that if a

- 29 -

fully funded plan consistently earns a 6 percent rate of return, approximately 70 percent of plan costs will be met out of investment earnings. Stated differently, 70 percent of the benefits will be paid out of investment income rather than plan contributions.

Plans subject to ERISA must set aside enough money to fund the normal cost of the plan currently and to amortize the supplemental liability, sometimes referred to as the "unfunded actuarial liability," over a maximum period of thirty years. Actuarial losses must be funded over a maximum of fifteen years. Thus far, plans in the public sector are not subject to any mandatory funding standards.

Designed to assure the actuarial soundness of the pension undertaking, these statutory funding standards and their legal underpinnings constitute the principal objection to a defined benefit plan from the standpoint of existing and potential plan sponsors. Under existing law, if a single employer defined benefit pension plan terminates and the plan assets are insufficient to discharge all benefit obligations under Title IV of ERISA, the plan sponsor may be required to contribute additional sums to the plan, or to the Pension Benefit Guaranty Corporation, up to 30 percent of its net worth as computed by the PBGC. Under proposed legislation, the 30 percent of net worth limitation would be removed and the plan sponsor would have to continue contributing to the plan until all vested benefits are fully funded. Employer participants in multi-employer pension plans have similar obligations. A signatory

- 30 -

firm that withdraws from a multiemployer plan must assume and ultimately fund its attributable share of the unfunded vested liabilities of the plan.

The Financial Accounting Standards Board (FASB) is considering an accounting principle, called a Statement, that would not only prescribe a new basis for computing annual pension cost accruals but would require that unfunded pension liabilities be shown on the plan sponsor's balance sheet. There would be an offsetting intangible asset to avoid an initial impact on net worth, but the intangible asset would have to be written off over a relatively short period of years. These proposals, which are likely to be adopted in some form, are based upon the assumption that a defined benefit plan will continue to function throughout the indefinite future and that all benefits accrued as of any given time will eventually have to be paid. There is a supporting assumption that the plan sponsor has a legal obligation to pay all promised benefits, the obligation running to the participants rather than to the plan. The FASB proposes that these new accounting requirements apply to pension plans of state and local government agencies.

These disadvantages of a defined benefit plan from the sponsor's vantage point must, of course, be weighed against the advantages of the arrangement that have nurtured and sustained it over the years.